

WRITE OR RADIATE?

Inscribed Matter vs. Electromagnetic Communication

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Abstract

Electromagnetic radiation can be used to communicate over both terrestrial and interstellar distances, with apparently modest energy requirements. Communication by sending physical artifacts (stone tablets, letters, or reels of tape) has by comparison seemed wasteful of energy. However, a key consideration has always been the perceived need to deliver messages as quickly as possible. If haste is not terribly important, sending messages inscribed on some material can be strikingly more energy efficient than communicating by electromagnetic waves over distances both very small and very large. For small distances, the relative efficiency of “inscribed matter” messages tells us that communication theory, with careful attention to energy budgets, may provide an interesting lens on biological processes. For large distances, this result suggests that our initial contact with extraterrestrial civilizations may be more likely to occur through information-bearing physical artifacts – essentially messages in a bottle – than via radio or optical signals. The possibility of biological material as “messages” also raises interesting questions about terrestrial biological history.

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